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(54) **Acquisition, measurement and control of thin webs of in-process textile materials**

Erlangen, Messung und Manipulieren dünner Faservliese bei der Verarbeitung von Textilmaterialien

Obtention, mesure et manipulation de voiles de fibres minces en cours de traitement de matériaux textiles

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to an apparatus for monitoring and processing a web of textile material being processed in a textile mill, the web including a plurality of entities, comprising an image analysis system with a computer for producing a signal containing information corresponding to the content of the web, said information including the location of entities in the web. The present invention also relates to a method for monitoring and processing a web of textile material being processed in a textile mill, the web including a plurality of entities, comprising analysing the web with an image analysis system having a computer for producing a signal containing information corresponding to the content of the web, said information including the location of entities in the web.

[0002] The thin webs are either intentionally formed from a sample of material acquired from the process or inherently found within certain processing machines. Measurement is by image analysis preferably based on charge-coupled device (CCD) cameras with extended spectral response.

[0003] To further define the field of this invention, means are provided for acquisition of in-process samples from continuously-operating textile manufacturing process machinery. Image analysis then enables spatial, spectral, and temporal pattern recognition or filtering (SSTF). SSTF in turn enables identification of individual entities in the thin webs. Finally, this invention discloses utilization of control signals derived from SSTF for the purposes of removing undesirable entities from thin webs,

BACKGROUND OF THE INVENTION.

[0004] The presence of undesirable entities in textile materials such as neps and trash particles is a problem whose severity is generally increasing. Production and harvesting techniques of cotton, for example, demand more aggressive cleaning action at the gin or in the early stages of processing in the textile mill. These actions remove foreign matter or trash but in many cases break the trash into smaller particles and leave some of it in the fibrous mass. This makes it more difficult to remove in later stages. Worse, this increasingly aggressive cleaning action generally increases the level of nep formation. It is therefore increasingly important to monitor the levels of these undesirable entities on a continuous basis in the gin or mill in order to optimally control them; one must measure before one can control.

[0005] In most production environments it is completely impossible to monitor 100% of the process throughput and samples of in-process material must be acquired for measurement. In textile processing machines the fiber states available for sampling are in tuft form or in sliver.

[0006] There are notable exceptions where judicious application of recently-developed image analysis technology enable 100% monitoring of the process throughput. A good example, as will be disclosed below in a preferred embodiment, is monitoring the thin web of a carding machine. Prior art methods and apparatus result in overwhelmingly expensive or otherwise impractical applications of image analysis. Our invention overcomes the difficulties.

[0007] WO 88/03063 discloses a foreign object separation apparatus having a camera for scanning the material delivered, a plurality of fluid blast nozzles and a reject position decoder. The fluid blast nozzles are located at a distance from a free falling stream of material containing the objects to be separated. When operating, this apparatus ejects foreign objects from said stream, but, unlike in the case of textile fibres, the objects are not submitted to forces such as present between fibres in a textile web. Therefore, this apparatus will only operate successfully on textile elements present in a loose form, but not on textile webs.

[0008] EP 0 545 129 (= Article 54(3) document) relates to a method and apparatus for detecting man-made fibres and/or defective fibres or foreign matter in the processing of silk waste. This method and apparatus is made for detecting and counting faults in a lap of silk fibres. Although means for excluding or removing such faults are recited, it is not clear from the description how such means are made and how they operate. Therefore, no valuable information can be gained from this document in this respect.

[0009] Also US 5,087,120 only relates to the problem of capturing cotton which is moving through a conduit for the purpose of analyzing it for properties like colour, trash content, and thereafter releasing it. The problem discussed is not that of exclusion of parts.

[0010] The closest prior art is disclosed in DE 39 28 279 describing a method and apparatus for monitoring undesirable parts such as trash and neps in an assembly of textile fibres. In order to detect all undesirable parts, the assembly is made as thin as possible. Therefrom, the monitoring process is designed to differentiate between different categories of undesirable parts. But, the purpose of this method is not to exclude such parts from the textile fibre assembly.

[0011] It is therefore an object of the present invention to propose a method and apparatus designed to remove undesirable entities from a supply or web composed of textile material with such care and precision that the fibres surrounding such entities are left undisturbed as far as possible in said web.

SUMMARY OF THE INVENTION

[0012] In accordance with the present invention, the object of the invention is solved by a method and apparatus presenting the features recited in claims 1 and 8.

[0013] Undesirable entities are found in preferably 100% of the thin card web, identified as to the severity of their impact upon subsequent processes or ultimately on sale price of the textile product derived therefrom, and then prioritized control action is taken to remove or exclude these entities from the web. These web-cleaning provisions are identified by the acronym "FIX".

[0014] In accordance with a particular aspect of the present invention, an apparatus is provided for monitoring and processing a web of textile materials, such as cotton being processed in a textile mill. The web includes a plurality of entities such as cotton fibers, neps, leaf trash, seed coat fragments, and other foreign matter. The web is monitored by an optical imaging unit, such as a video camera, and a monitor signal is produced containing information corresponding to the content of the web, including the location of entities in the web. A computer receives the monitor signal and determines the position of the entities based on the location information and generates control signals based on the determined positions. Web processing means receives the control signals and processes the web in response thereto for reducing the amount of entities contained in the web.

[0015] The web processor includes excluders positioned downstream of the imaging unit for selectively excluding entities from the web. The computer is operable to determine when one or more entities are positioned for being excluded by the excluder and issuing an eject command in response to the entities being so positioned and the excluders respond to the eject commands for ejecting entities from the web. The preferred excluders include a row of nozzles positioned in a side-by-side relationship downstream of the monitor extending across the web. Pressurized air is supplied to the nozzles by a fast-acting pneumatic valves under the control of the computer. When the monitor identities an entity to be excluded, the computer determines when the entity will pass under the nozzles and which nozzle it will pass under. Then, the computer will issue a command to the fast-acting valves causing them to release air to the appropriate nozzle and blast the entity from the web with air.

[0016] In a preferred embodiment the computer is connected to a speed detector for detecting the speed of the web and producing a speed signal. Utilizing the monitor signal and the speed signal, the computer calculates the location of entities of interest relative to a web processor. Specifically, the computer determines the time at which one or more undesirable entities will be positioned at the web processor based on the location information contained in the monitor signal and the speed of the web. When undesirable entities are positioned at the web processor, they are processed under the control of the computer.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The present invention may best be understood by reference to the following Detailed Description of preferred embodiments when considered in conjunction with the drawings in which:

FIG. 1 is a cross-sectional view illustrating an implementation of the present invention in conjunction with a web on a doffer cylinder and/or a web as it leaves the doff rolls of a textile machine;
FIG. 2 shows an end cross-sectional view of a preferred excluder (ejector) of the present invention;
FIG. 3 shows a cross-sectional view of the excluder taken through section lines 19-19 shown in FIG. 2;
FIGS. 4 and 5 are enlarged views of the exclusions of 350 corresponding to FIGS. 2 and 3 , respectively; and
FIG. 6 is a cross-sectional view illustrating an ejector system of the present invention implemented in conjunction with a clothed cylinder such as a doffer cylinder.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT WEB FORMING SAMPLER

[0018] FIG. 1 reveals a most important embodiment for on-line process monitoring wherein image analysis means 50 inspect the thin web on a doffer cylinder 110 of a carding machine 112. Alternatively, image analysis means 50 inspect the web 120 as it exits the doff or crush rolls 122 and before it proceeds through a trumpet 125 and becomes a sliver 126. It will be readily understood that the entities, in terms of orientation and density are essentially the same on the doffing cylinder 110 as in the web 120. It will also be appreciated that the relative advantages of inspecting the web in "free" space 124, where front lighting and back lighting are much more readily achieved, is preferable for the highest contrast and resolution. However, in some cases it is not feasible to measure the web at space 124 as indicated in FIG. 1. In other cases the discrimination abilities of the image analysis system 50 are entirely adequate when examining the thin web as it is transported by the teeth on the doffer cylinder 110.

[0019] FIG . 1 thus discloses means by which thin webs may be formed from samples of textile material for the preferred examination by image analysis means. The samples may be automatically acquired from an operating process, may be part of a test sample for a laboratory quality control instruments, or may be inherently found already as thin webs in carding machines or the like. All may be advantageously examined with our preferred image analysis means 50.

[0020] FIG. 2 shows an end cross-sectional view of a preferred excluder 300 using compressed air to exclude or clear undesirable entities from the thin web 320, and FIG. 3 shows a cross-sectional view taken

through section lines 19-19 shown in FIG. 2 . FIGS. 4 and 5 are enlarged views of the exclusion zone 350 corresponding to FIGS. 2 and 3 , respectively. In the views, FIGS. 2 and 4 , the thin web 320 is seen to be transported through plates 330 and 332 which have a row of inlet nozzles 334 with approximately rectangular apertures 335 whose widths are on the order of three millimeters and are shown in FIG. 4 as having a width D, 338. In the cross-sectional view of FIG. 5 , the length of the rectangular apertures 335 is shown to be on the order of one centimeter, and the spacing 340 (S) between the apertures is also in the order of one centimeter. The web 320 has a width of approximately one meter or 40 inches, and the row of nozzles 334 extends perpendicularly across the web 320. A single tapered deceleration nozzle 336 having a width also about three millimeters, which is shown in FIG. 2 , and a length of a meter is positioned beneath the row of nozzles 334 and receives blasts of air therefrom.

[0021] Referring to FIGS. 2 and 3 , the row of nozzles 334 is positioned a known distance downstream of an optical imaging system . Since the speed of the web 344 is constantly reported to the computer system 144 by a rotary encoder , the computer calculates the time required for any particular segment of the web to pass from, the imaging system to the row of nozzles 334. When an undesirable entity is identified by the system , its position (spatial coordinates) is determined with respect to the thin web 134 , and the system calculates the time required for the undesirable entity to reach the row of nozzles.

[0022] Based on the lateral position of the entity, the computer system 144 also determines which nozzle 334 will be above the entity when it arrives at the nozzles 334. At the appropriate time, when the entity arrives in the exclusion zone 350, a short burst of compressed air is applied to an appropriate one of a plurality of eductor feed pipes 355 by one of the fast acting solenoid valves 354. The computer system applies control signals through control lines 353 to actuate one or more of the valves 354 and release compressed air through the feed pipes 355. Clean compressed air is supplied by pipe 352 to each of the feed pipes 355, and each of the feed pipes 355 is positioned in the mouth 337 of one of the nozzles 334. The compressed air exiting the feed pipe 355 entrains a volumetric flow from a supply air pipe 360 that surrounds the nozzle mouths 337. The combined air flow from the feed pipes 355 and the supply air pipe 360 forms a blast of air that strikes and ejects the entity 356 out of the thin web 320, through the decelerating nozzle 336, and into a waste pipe 358. The decelerating nozzle 336 is sized to cause a very slight positive initial pressure in the exclusion zone 350, thus pushing the surrounding components of the thin web 320 away from the exclusion zone 350 while at the same time blasting the undesired entity 356 into the waste collection pipe 358. After the initial positive pressure, when the compressed air from feed pipe 355 is turned off, there is a short interval of negative pressure caused by the momentum of the moving air in the decelerating nozzle 336 which causes the components surrounding the exclusion region (a rectangle of about 1 cm X 3 mm) to move inwardly; this negative pressure interval is timed to partially close the exclusion hole in the web 320 but to not pull the web 320 into the waste collection pipe 158.

[0023] Air is continuously moving through waste collection pipe 358 to transport the undesirable entities out of the system. Waste collection pipe 358 and inlet plenum 360 are sized to not interfere with the independent operation of the exclusion nozzles 334 and 336, of which there are about one hundred for a web from typical card. Furthermore, the supply air pipe 360 is sufficiently large that the interaction of the short pulse of any one of the exclusion nozzles 334 does not materially affect any of the others, even when more than one of these nozzles 334 is operating simultaneously. The air entering supply pipe 360 is filtered and otherwise conditioned to accommodate the purposes of exclusion.

[0024] FIG. 6 shows a second type of compressed air excluder 400 suitable for removing entitles from clothed cylinders, such as the doffer cylinder 110 of FIG. 1. A preferred location 402 for excluder 400 marked as "X" on FIGS.1 and 6 is between the image analyzer system 50 and the crush rolls 122. Referring now to FIG. 6 , the image analyzer system 50 Finds and Identifies an entity on the doffer cylinder 110 which is to be excluded, said pattern recognition, decisions and timing being handled by computer , and control signals which cause excluder controller 404 to energize fast-acting solenoid valve 406. This action supplies clean compressed air to plenum 408 and to blast air orifice 410. Simultaneously, (or separately, with another value and with different timing, if desired) solenoid valve 406 supplies clean compressed air to coaxial eductor 420. Assuming that blast air flow 412 and eductor driven air flow 416 start simultaneously, it is clear that the combined actions of pressure-driven blast air flow 412 and suction driven eductor air flow 416 are to "push and pull" a small volume or "pulse" of air, moving at high speed, across doffer wire 422 in a direction that permits the entity 418 and a few associated fibers 419 to be lifted off wire 422 and pulled into collector pipe 424. Flow 414 is driven by entrainment with flow 412 and by suction associated with flow 416. To summarize, the excluder 400 action may be thought of as providing a short duration (milliseconds) rapidly moving (near Mach 1) volumetric pulse (10's of cubic centimeters) which sweeps the entities off the cylinder wire and excludes them from the web. The width and length of the excluder orifices is about 3 mm X 10 mm, like the excluder 300 of FIGS. 2 - 5 , and there are also 100 of them across the one meter width of the web on the doffer cylinder 110.

[0025] Compressed air exclusion nozzles are illustrated in this preferred embodiment but other exclusion means may be used as functionally equivalent. Such

means include mechanical punching, cutting, or hooking, or the like. While it is preferred to use the system to Find and Identify the features of interest, such as trash in a moving cotton web, it should be understood that other detection systems could be used in conjunction with the excluder. Likewise, other excluders or fiber processors could be used with the detection system described herein. The various embodiments described herein are intended as examples illustrating the present invention and it will be understood that the present invention is capable of numerous rearrangements, modifications and substitution of parts without departing from the scope of the invention as defined in the appended claims.

Claims

1. Apparatus for monitoring and processing a web (320) of textile material being processed in a textile mill, the web including a plurality of entities, comprising

   an image analysis system (50) with a computer (144) for producing a signal containing information corresponding to the content of the web, said information including the location of entities in the web, characterized by
   excluders (300) positioned downstreams of said image analysis system, for selectively excluding undesirable entities from the web and having feed pipes (355) for supplying compressed air, said feed pipes being positioned in inlet nozzles (334) for ejecting entities out of the web through a decelerating nozzle (336) sized to cause a very slight positive initial pressure in an exclusion zone (350) thus pushing the surrounding components of the web (320) away from the exclusion zone (350) as well as a short interval of negative pressure when compressed air in the feed pipes is turned off, which causes the components surrounding the exclusion zone to move inwardly.

2. Apparatus for monitoring and processing a web (320) of textile material being processed in a textile mill, the web including a plurality of entities, comprising

   an image analysis system (50) with a computer for producing a signal containing information corresponding to the content of the web, said information including the location of entities in the web, characterized by
   excluders (400) positioned downstreams of said image analysis system, for excluding undesirable entities from clothed cylinders (110) and having a blast air orifice (410) exposed to a pressure-driven blast air flow (412) from a plenum (408) and a suction driven eductor air flow (416) from a collector pipe (424) for lifting-off entities from the clothed cylinders and into said collector pipe.

3. Apparatus according to claim 1, wherein said inlet nozzles (334) are positioned and oriented to direct pressurized air toward and into said web in response to eject commands for ejecting entities from the web, and wherein said decelerating nozzle (336) is connected to a waste collection pipe (358).

4. Apparatus according to claim 1, wherein said computer system (144) is connected to a speed detector for detecting the speed of the web and producing a speed signal in response to and indicating the web speed, and designed for receiving the monitor signal and the speed signal and determining a position of the entities based on the location information and the speed of the web and for generating control signals based on the determined position and for determining the time at which one or more undesirable entities will be positioned at the nozzles based on the location information and the speed of the web.

5. Apparatus according to claim 1, characterised by said feed pipes (355) being connected to a plurality of fast acting pneumatic valves (354) for receiving pressurized air from a source of pressurized air and selectively releasing said pressurized air for a limited time interval.

6. Method for monitoring and processing a web (320) of textile material being processed in a textile mill, the web including a plurality of entities, comprising

   analysing the web with an image analysis system (50) having a computer (144) for producing a signal containing information corresponding to the content of the web, said information including the location of entities in the web, characterized by
   selectively excluding undesirable entities from the web downstreams of said image analysis system, by supplying compressed air through feed pipes (355), positioned in inlet nozzles (334) for ejecting entities out of the web through a decelerating nozzle (336) sized to cause a very slight positive initial pressure in an exclusion zone (350) thus pushing the surrounding components of the web (320) away from the exclusion zone (350) as well as a short interval of negative pressure when compressed air in the feed pipes is turned off, which causes the components surrounding the exclusion region to move inwardly.

Patentansprüche

1. Vorrichtung zur Überwachung und Verarbeitung einer Bahn (320) aus textilem Material, das in einer Textilfabrik verarbeitet wird, wobei die Bahn eine Mehrzahl Teilchen enthält, mit einem Bildverarbeitungssystem (50) mit einem Rechner (144) zur Erzeugung eines Signales, das Angaben über den Inhalt der Bahn enthält und die Angaben die Lage der Teilchen in der Bahn einschliessen, gekennzeichnet durch Ausscheider (300), die stromabwärts des Bildverarbeitungssystems (50) angeordnet sind, um unerwünschte Teilchen selektiv aus der Bahn auszuscheiden, mit Zuführrohren (355) zur Zufuhr von Druckluft, die in Einlassdüsen (334) angeordnet sind um Teilchen aus der Bahn und durch eine Verzögerungsdüse (336) auszustossen, die so bemessen ist, dass in einer Ausscheidungszone (350) anfänglich ein geringer positiver Druck gebildet wird, der umgebende Anteile der Bahn (320) von der Ausscheidungszone (350) wegdrängt und für eine kurze Zeit, wenn die Druckluft in den Zuführrohren unterbrochen wird, ein Unterdruck gebildet wird, so dass die Anteile in die Umgebung der Ausscheidungszone zurückkehren.

2. Vorrichtung zur Überwachung und Verarbeitung einer Bahn (320) aus textilem Material, das in einer Textilfabrik verarbeitet wird, wobei die Bahn eine Mehrzahl Teilchen enthält, mit einem Bildverarbeitungssystem (50) mit einem Rechner zur Erzeugung eines Signales, das Angaben über den Inhalt der Bahn enthält und die Angaben die Lage der Teilchen in der Bahn einschliessen, gekennzeichnet durch Ausscheider (300), die stromabwärts des Bildverarbeitungssystems (50) angeordnet sind, um unerwünschte Teilchen von einem Hauptzylinder (110) auszuscheiden, mit einer Ausblasöffnung (410), die einem Druckluftstoss (412) aus einer Luftzuführleitung (408) ausgesetzt ist, und einem durch einen Eduktor angesaugten Luftstrom (416) aus einem Sammelrohr (424), der Teilchen von den Hauptzylindern abhebt und in das Sammelrohr abgibt.

3. Vorrichtung nach Anspruch 1, bei der die Einlassdüsen (334) so gerichtet und angeordnet sind, dass sie als Antwort auf Ausscheidungsbefehle Druckluft gegen und in die genannte Bahn lenken um Teilchen aus der Bahn auszuscheiden und die Verzögerungsdüse (336) an ein Abfallsammelrohr (358) angeschlossen ist.

4. Vorrichtung nach Anspruch 1, bei der der genannte Rechner (144) mit einem Geschwindigkeitsmesser verbunden ist, der die Geschwindigkeit der Bahn misst und ein Geschwindigkeitssignal davon ableitet und die Geschwindigkeit der Bahn anzeigt, und zur Aufnahme der Signale der Überwachung und der Geschwindigkeit und zur Bestimmung der Position der Teilchen ausgehend von der Angabe über die Lage und die Geschwindigkeit der Bahn und zur Erzeugung von Steuerbefehlen aus der bestimmten Position und zur Bestimmung der Zeit zu welcher ein oder mehrere Teilchen bei den Düsen erscheinen werden, aus der Angabe über die Lage und der Geschwindigkeit der Bahn, ausgebildet ist.

5. Vorrichtung nach Anspruch 1, bei der die genannten Zuführrohre (355) mit einer Mehrzahl schnellschaltender Pneumatikventile (354) verbunden sind um Druckluft aus einer Druckluftquelle zu erhalten und um die Druckluft selektiv und für eine begrenzte Zeitspanne abzugeben.

6. Verfahren zur Überwachung und Verarbeitung einer Bahn (320) aus textilem Material, das in einer Textilfabrik verarbeitet wird, wobei die Bahn eine Mehrzahl Teilchen enthält und die Bahn mit einem Bildverarbeitungssystem (50) geprüft wird, das einen Rechner (144) zur Erzeugung eines Signales aufweist, das Angaben über den Inhalt der Bahn enthält und die Angaben die Lage der Teilchen in der Bahn einschliessen, dadurch gekennzeichnet, dass unerwünschte Teilchen stromabwärts des Bildverarbeitungssystems (50) selektiv aus der Bahn ausgescheiden werden indem Druckluft durch Zuführrohre (355) zugeführt wird, die in Einlassdüsen (334) angeordnet sind, um Teilchen durch eine Verzögerungsdüse (336) aus der Bahn auszustossen, die so bemessen ist, dass in einer Ausscheidungszone (350) anfänglich ein geringer positiver Druck entsteht, der umgebende Anteile der Bahn (320) von der Ausscheidungszone (350) wegdrängt und, wenn die Druckluft in den Zuführrohren unterbrochen wird, für eine kurze Zeit ein Unterdruck gebildet wird, so dass die Anteile in die Umgebung der Ausscheidungszone zurückkehren.

Revendications

1. Appareil pour surveiller et traiter un voile (320) de matériau textile traité dans un atelier de tissage textile, le voile incluant une pluralité d'entités, comprenant

   un système d'analyse d'image (50) avec un ordinateur (144) pour produire un signal contenant une information correspondant au contenu du voile, ladite information incluant l'emplacement d'entités dans le voile, caractérisé par
   des organes d'exclusion (300) positionnés en aval dudit système d'analyse d'image, pour exclure sélectivement des entités non recher-

chées du voile et comportant des tuyaux d'amenée (355) pour une amenée d'air comprimé, lesdits tuyaux d'amenée étant positionnés dans des buses d'entrée (334) pour éjecter les entités du voile à travers une buse de ralentissement (336) dimensionnée pour provoquer une très légère pression initiale positive dans une zone d'exclusion (350) en poussant ainsi les composants environnants du voile (320) au loin de la zone d'exclusion (350) ainsi qu'un court intervalle de pression négative lorsque l'air comprimé dans les tuyaux d'amenée est arrêté ce qui amène les composants entourant la zone d'exclusion à se déplacer vers l'intérieur.

2. Appareil pour surveiller et traiter un voile (320) en matériau textile traité dans un atelier de tissage textile, le voile incluant une pluralité d'entités, comprenant

un système d'analyse d'image (50) avec un ordinateur pour produire un signal contenant une information correspondant au contenu du voile, ladite information incluant l'emplacement d'entités dans le voile, caractérisé par
des organes d'exclusion (400) positionnés en aval dudit système d'analyse d'image, pour exclure des entités non recherchées de cylindres revêtus (110) et comportant un orifice d'air de soufflage (410) exposé à un flux d'air de soufflage entraîné par pression (412) d'un collecteur (408) et un flux d'air d'échappement entraîné par aspiration (416) d'un tuyau collecteur (424) pour relever des entités des cylindres revêtus et les évacuer dans ledit tuyau de collecte.

3. Appareil selon la revendication 1, dans lequel lesdites buses d'entrée (334) sont positionnées et orientées pour diriger l'air comprimé vers et dans ledit voile en réponse à des commandes d'éjection pour éjecter des entités du voile, et dans lequel ladite buse de ralentissement (336) est reliée à un tuyau de collecte de déchets (358).

4. Appareil selon la revendication 1, dans lequel ledit système d'ordinateur (144) est relié à un détecteur de vitesse pour détecter la vitesse du voile et pour produire un signal de vitesse en réponse à et indiquant la vitesse du voile, et conçu pour recevoir un signal de moniteur et le signal de vitesse, et pour déterminer une position des entités sur la base de l'information d'emplacement et de la vitesse du voile et pour produire des signaux de commande sur la base de la position déterminée et pour déterminer l'instant auquel une ou plusieurs entités non recherchées seront positionnées aux buses, sur la base de l'information d'emplacement et de la vitesse du voile.

5. Appareil selon la revendication 1, caractérisé en ce que lesdits tuyaux d'amenée (355) sont reliés à une pluralité de vannes pneumatiques (354) à action rapide destinées à recevoir de l'air comprimé d'une source d'air comprimé et à libérer sélectivement ledit air comprimé pendant un intervalle de temps limité.

6. Procédé pour surveiller et traiter un voile (320) en matériau textile traité dans un atelier de tissage textile, le voile incluant une pluralité d'entités, comprenant

l'analyse du voile au moyen d'un système d'analyse d'image (50) comportant un ordinateur (144) pour produire un signal contenant une information correspondant au contenu du voile, ladite information incluant l'emplacement des entités dans le voile, caractérisé par
l'exclusion sélective d'entités non recherchées du voile en aval dudit système d'analyse d'image, en amenant de l'air comprimé à travers des tuyaux d'amenée (355), positionnés dans les buses d'entrée (334) pour éjecter des entités du voile à travers une buse de ralentissement (336) dimensionnée pour provoquer une très légère pression initiale positive dans une zone d'exclusion (350) en poussant ainsi les composants environnants du voile (320) au loin de la zone d'exclusion (350) ainsi qu'un court intervalle de pression négative lorsque l'air comprimé dans les tuyaux d'amenée est arrêté, ce qui amène les composants entourant la région d'exclusion à se déplacer vers l'intérieur.

Fig. 1

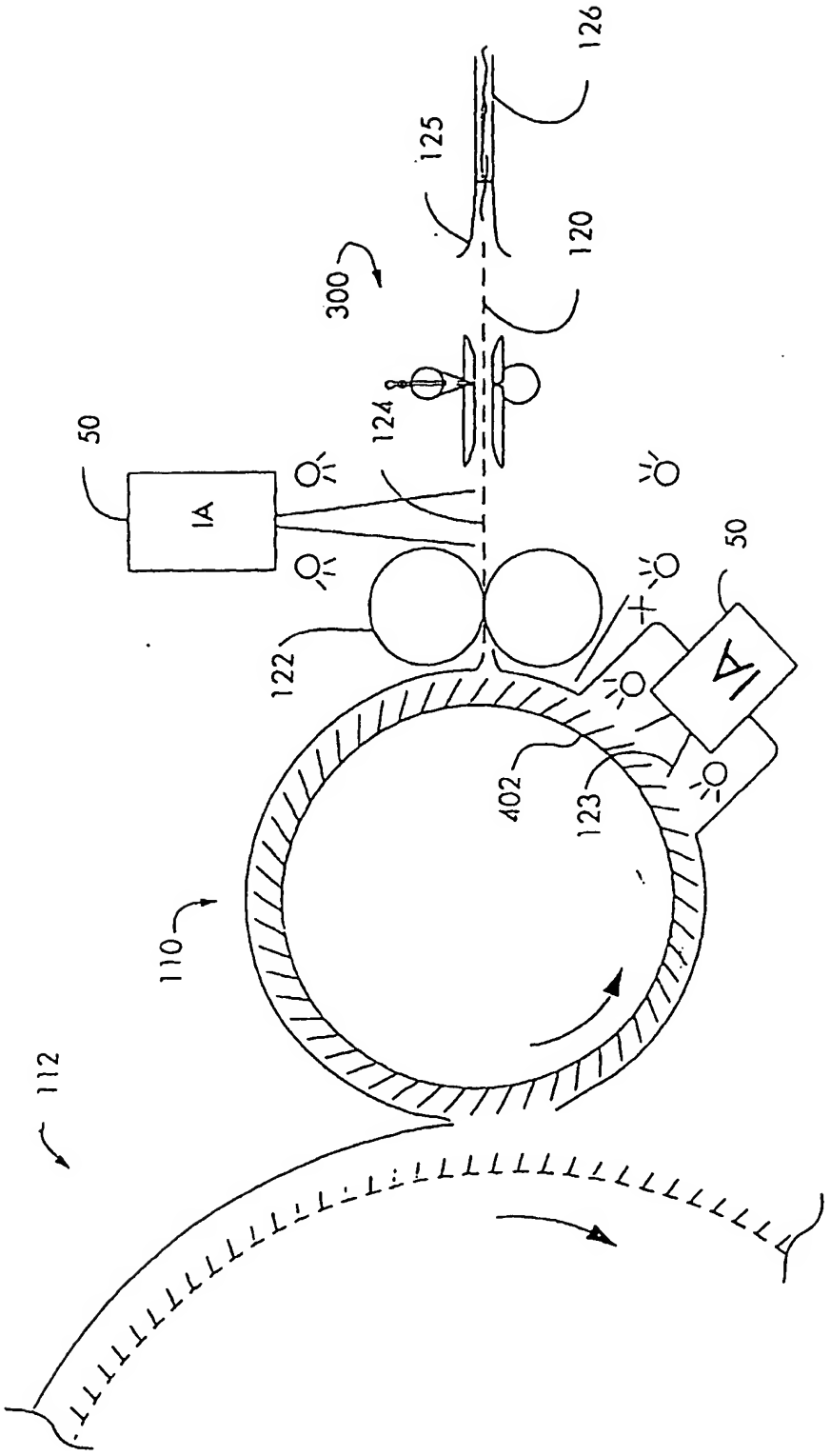

Fig. 3

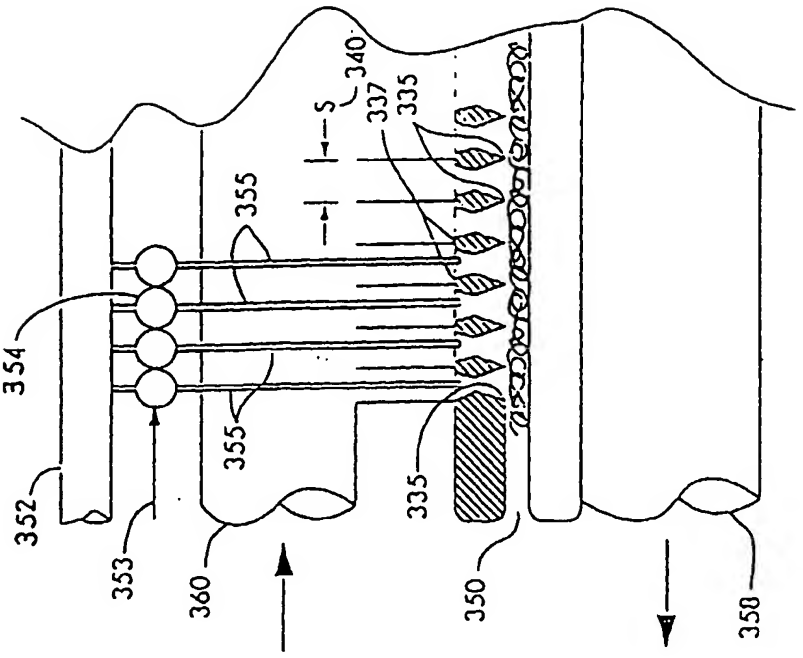
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Fig. 2

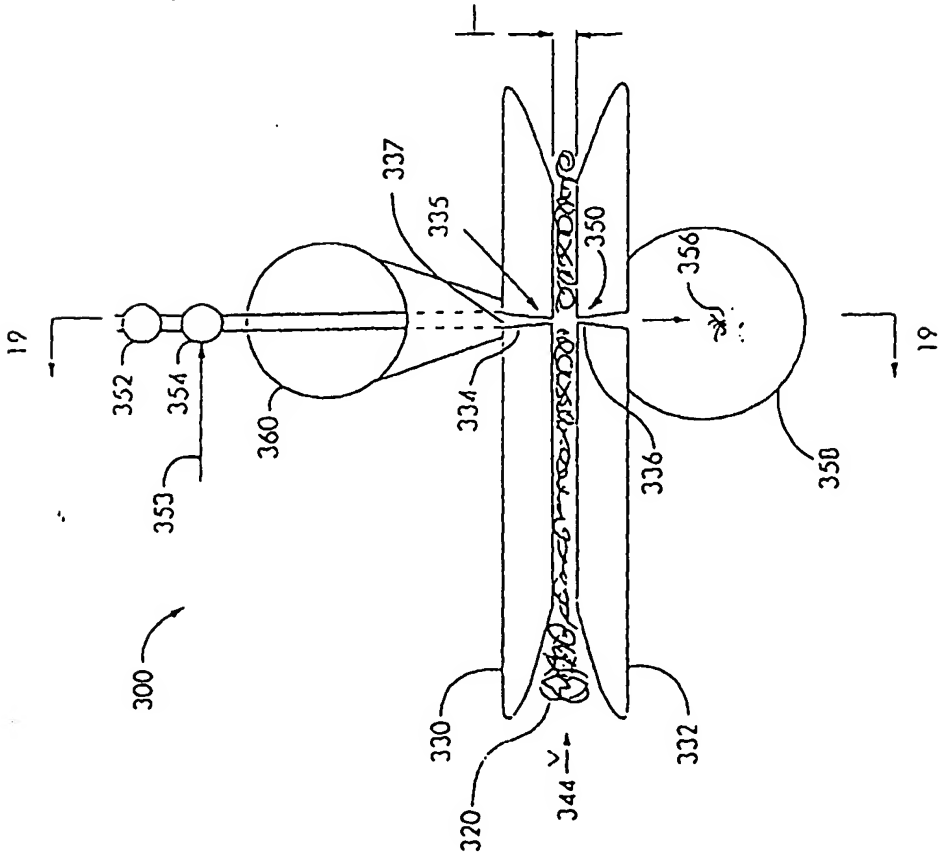
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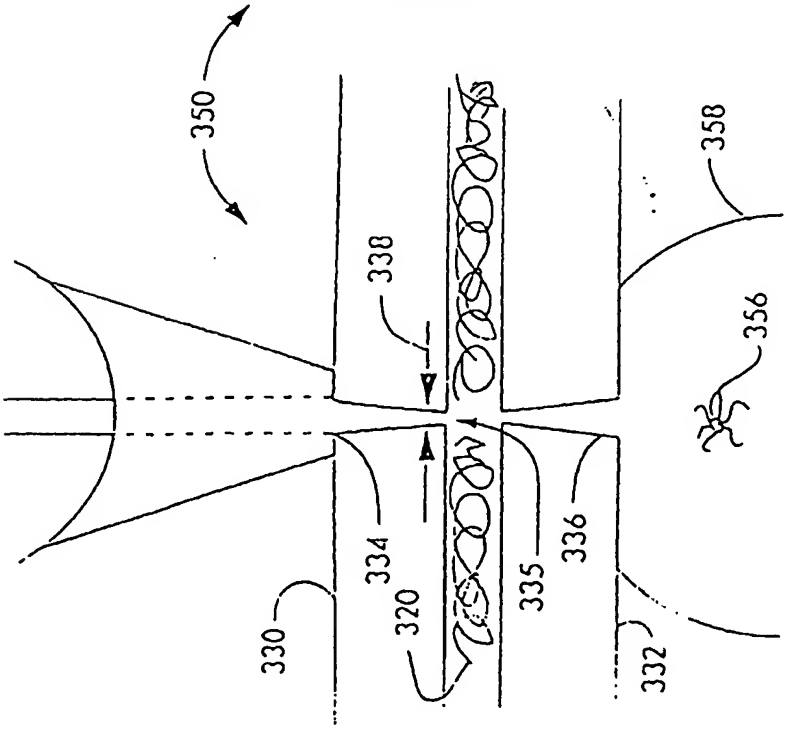
Fig. 4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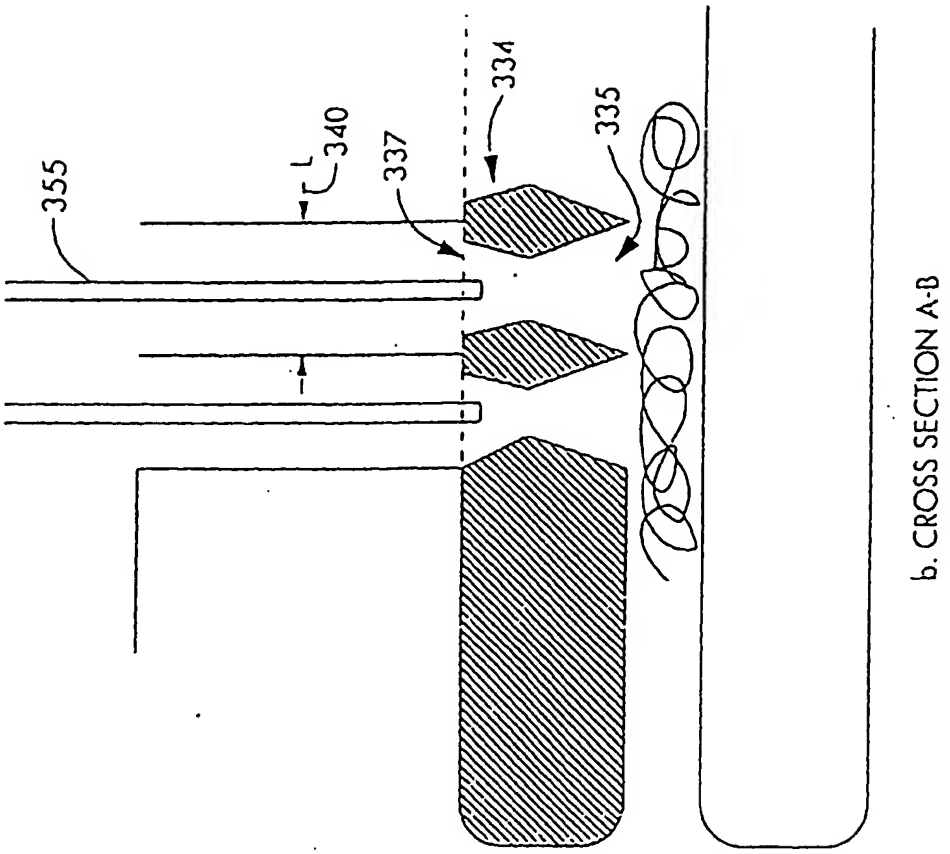
a. END

Fig. 5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b. CROSS SECTION A-B

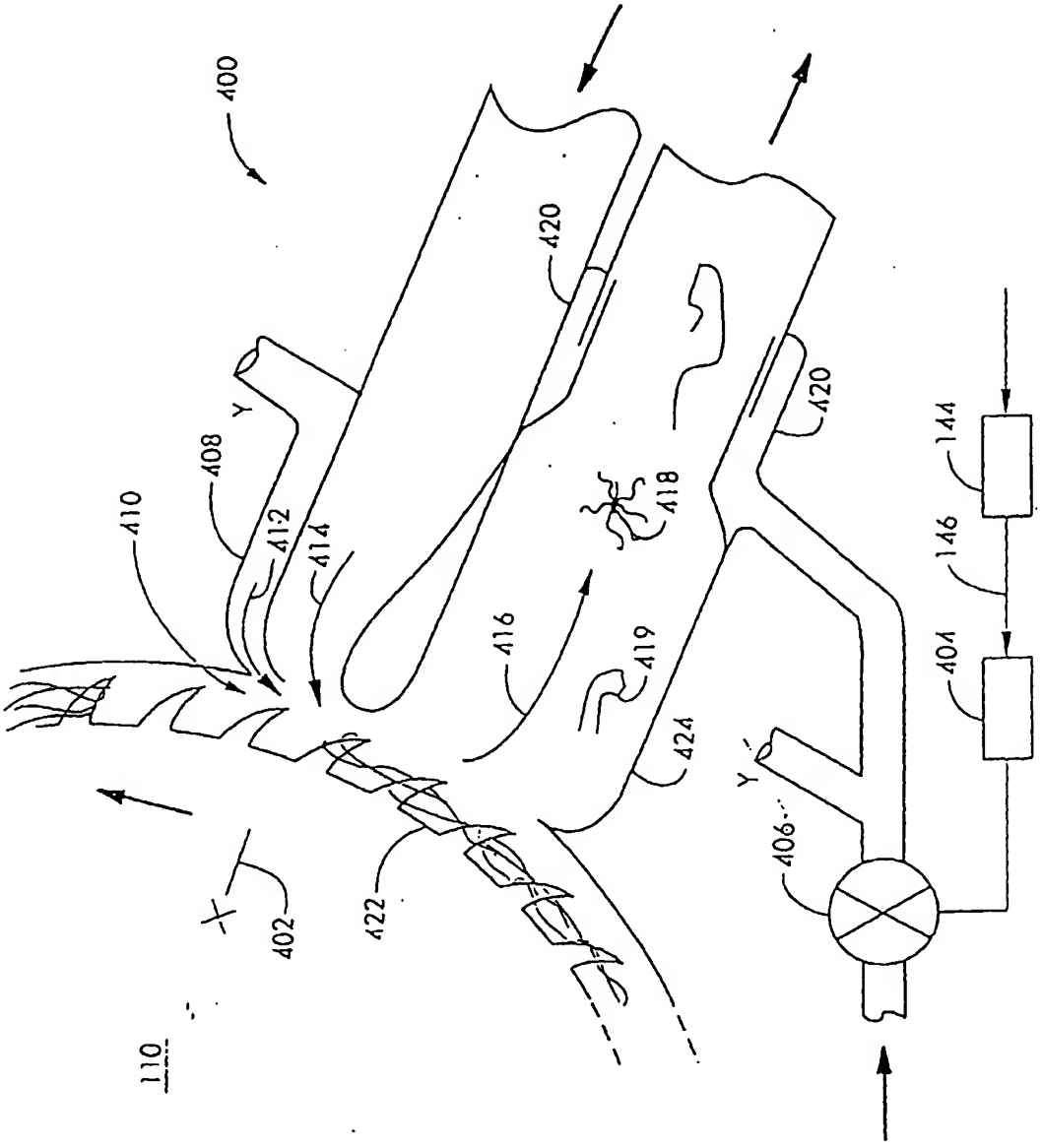
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Fig. 6